

REMARKS

By this amendment, claims 1, 8, and, 15 will be revised. Claims 1-21 remain pending.

No claims are cancelled or added.

No new matter is added. Basis for the amendment of Claims 1, 8, and 15 can be found in the specification at least at page 5, lines 17-18, page 8, lines 25-29, page 9, lines 25-30, and page 10, lines 26-31.

Reconsideration of the application, as amended, is requested.

Rejections under 35 U.S.C. 103

All the pending claims stand rejected as allegedly being obvious from some combination of publications including Ruff et al (5,066,472) in view of WO 03/033115 (using Hirano et al, US 2004/0258596 as unofficial English translation) and Terry et al (3,900,312).

All the pending claims also stand rejected as allegedly being obvious from some combination of publications including Breneman et al (4,743,344) in view of Keller et al (3,878,291), WO '115 (using Hirano '596 as an unofficial English translation) and Terry '312.

Applicant respectfully disagrees.

The above-listed claims call for:

“combining a flowable solid material that includes at least one low volatility, water-reactive metal chloride with a powdered hydrate, in the absence of liquid water, to provide a mixture of solids”

and

“thermally [decomposing the hydrate] to release water vapor which then reacts with a low volatility, water-reactive metal chloride in [a] flowable solid material without the formation of a liquid waste product; the amount of the hydrate and the

water content thereof being sufficient to completely hydrate all the metal chloride.”

The cited publications do not show or suggest the presently claimed methods. In particular, they do not suggest combining and heating two solids: (1) the flowable solid material and (2) a powdered hydrate, in which methods the amount of the hydrate and the water content thereof is sufficient to completely hydrate all the metal chloride.

The Office action (page 3, lines 1-2) acknowledges:

“Ruff '472 does not disclose (1) the use of a powdered hydrate to react with the metal chloride and (2) the presence of sodium chloride.”

The Office action (page 6, lines 19-21) also acknowledges:

“Breneman '344 does not disclose (1) the step of heating the concentrated metal chloride residue with a powdered hydrate and (2) the addition of NaCl to the metal chloride residue.”

WO '115 is asserted in the Office action (page 3, lines 3-8) as filling the gaps in Ruff '472 and Breneman '344:

“For difference (1), WO '115 discloses a method for **removing a halogen series gas by contacting a gas** containing halogen series gas forming at least one kind selected from the group consisting of HF, HCl, HBr and HI by water with a granule containing from 60 to 99.9 mass % of a solid base and from 0.1 to 40 mass% of a carbonaceous material to the total mass amount of the granule in the presence of water (note WO '115, claim or Hirano '596, claim 1).” (emphasis added)

That assertion is not correct because the method of WO '115 differs considerably from the methods claimed in the present application. It is not appropriate to combine WO '115 with the other cited publications; and no such combination would produce the methods claimed in the present application.

WO '115 does not describe how to deal with the problem of treating a “**low volatility**” water-reactive metal chloride, which is the subject of the presently claimed methods. Instead, WO '115 is entirely concerned with “removing a halogen series **gas**.” (See, e.g., Hirano '596 abstract and all claims).

The method of WO '115 could not be effective in treating a chloride-bearing solid material, which is the subject of the pending claims. To be treated, the solid chloride-bearing material must transport to and react with the base. That happens with the presently claimed methods because the solid water-reactive metal chloride and the powdered hydrate are **mixed** to provide a **mixture of solids**. The method of WO '115 does not suggest any way to combine a base with a chloride-bearing **solid** material such that they could effectively react.

Any contacting device designed for WO '115's gas treatment process would be unsuitable for treating a chloride-bearing solid material. WO '115 describes flowing gas through a packed bed (see Hirano '596 at paragraph [0059]). This would be useless for the treatment of a chloride-bearing solid material, which is the subject of the presently claimed methods.

Further, the method of WO '115 will not achieve its desired results unless a halogen series gas is present at the outset. That is not the situation of the presently claimed methods wherein the starting material is a **solid** metal chloride, not a gas.

It therefore is not appropriate to combine WO '115 with the other cited publications.

None of the cited publications describes or suggest the advantageous use of a hydrate as called for by the pending claims.

The use of a hydrate is advantageous in that it readily can be heated to release water vapor and thereby avoid the need to add liquid or gaseous water from an outside source.

In an attempt to address the fact that neither Ruff '472 nor Breneman '344 suggests the use of a hydrate, the Office action (page 4, lines 6-11) asserts that:

“Since WO '115 prefers a dry type treating method, one skilled in the art would select any appropriate solid source that contains water so that the residue can be treated in dry type treating method.”

But WO '115's favored base is sodium hydrogencarbonate or potassium hydrogencarbonate. (see Hirano '596 at paragraphs [0009] and [0050]). Neither of these well-known bases is a hydrate. Hirano '596 says some amount of water is formed by the reaction of Formula 2, but that is not the method that is claimed in the present application.

There is nothing in WO '115 or elsewhere to support the naked conclusion that it would be obvious for one skilled in the art to select any appropriate solid source that contains water. Where in any cited publication is there any statement that makes this obvious?

More specifically, there is nothing in the cited publications to suggest methods with “the amount of the hydrate and **the water content thereof being sufficient to completely hydrate all the metal chloride.**” This is well beyond the teachings of the cited publications.

WO '115 does not suggest this concept. Because it does not describe a hydrate, **WO '115 cannot suggest anything about a water content** sufficient to hydrate all the metal chloride.

Thus, even if it were proper to combine the teaching of publications as distinct as Ruff '472 or Breneman '344 and WO '115 (which is not admitted), there still would be no suggestion of the claimed methods with “the amount of the hydrate and the water content thereof being sufficient to completely hydrate all the metal chloride.”

Applicant thus respectfully requests withdrawal of all rejections based on any combination of Ruff '472 or Breneman '344 and WO '115.

More generally, as mentioned above, the present amendments emphasize that the claimed methods call for combining **two solids**: (1) a flowable solid material that includes at least one low volatility, water-reactive metal chloride and (2) a powdered hydrate.

HCl is released from the water reactive metal chloride without forming an aqueous HCl phase. As explained in the present specification, this is significant because it avoids having to deal with corrosive liquids as can be formed when liquid water is added.

The cited publications do not show or suggest reacting a flowable solid material that includes at least one low volatility, water-reactive metal chloride with a powdered hydrate in the absence of liquid water as claimed.

Applicant would again point out that the cited **Ruff '472 does not suggest** hydrolysis by heating **a combination of two solids**. Instead, Ruff '472 teaches the addition of significant amounts of water vapor and HCl to a residue. For example, claim 1 of Ruff '472 calls for:

“treating the remaining residue with water vapor at a temperature of 100° to 300° C. in the presence of additional hydrogen chloride in amounts of 10 to 40 wt.-% with respect to the hydrogen chloride and water mixture . . .”

And at Col. 3, Lines 47-54, Ruff '472 gives the example:

“The same distillation residue as in the above Comparison Example was reacted by the method of the invention. For a period of 18 minutes, 150 kg of the pre-dried residue was treated with a stream of 152.1 kg/h of steam at a temperature of 170° C. to which 185.8 kg/h of a mixture of hydrogen chloride and water vapor, corresponding to an azeotropic composition of hydrochloric acid of 20.4 wt.-% of hydrogen chloride, was added.”

Ruff '472 thus fails to teach a system that avoids corrosive liquids.

And again, Applicant would point out that **WO ‘115** (using Hirano et al, US 2004/0258596 as unofficial English translation) **does not suggest** hydrolysis by heating a **combination of two solids** and does not fill the gaps of Ruff ‘472.

WO ‘115 describes a treatment of hot acid gases, not solids as is called for by the claims of the present application. Claim 1 of US 2004/0258596 reads:

A method for removing a halogen series gas, which comprises **contacting a gas** containing a halogen series gas forming at least one kind selected from the group consisting of HF, HCl, HBr and HI by water with a granule containing from 60 to 99.9 mass % of a solid base and from 0.1 to 40 mass % of a carbonaceous material to the total mass amount of the granule **in the presence of water**.
(emphasis added)

Terry ‘312 does not suggest hydrolysis by heating a **combination of two solids**. The cited claim 5 of Terry refers to a “process for producing aluminum in essentially elemental form” by a specific process which is not subject matter related to the presently claimed invention.

Breneman ‘344 does not suggest hydrolysis by heating a **combination of two solids**. This patent is only significant in that it describes a metal chloride residue. The cited passage of Breneman ‘344 (Col. 2, lines 62-66) describes treatment with a hydrocarbon such as kerosene, which has nothing to do with the presently claimed processes.

Keller ‘291 does not suggest hydrolysis by heating a **combination of two solids**, including hydrate to release water vapor *in situ*. The cited passage of Keller ‘291 (Col. 5, Lines 50-57), describes an external source of water:

“While retaining the direction of rotation of the paddle dryer 14 after drying off the solids has taken place, **steam is blown in through conduit 50** for hydrolysis. The **hydrogen chloride set free is absorbed in water** and returned to the process (not shown).” (emphasis added)

Keller ‘291 thus does not contemplate a process suitable for operating in vessels that are not acid resistant.

Furthermore, claims 11 and 18 call for the solid hydrate being **trona**, a natural form of sodium sesquicarbonate. Trona has proven to be particularly well suited for treating solid water reactive metal chloride. Applicant has found no suggestion of using trona in the cited publications.

The cited publications, whether taken alone or together, fail to suggest the presently claimed methods which are able to proceed, without the formation of a liquid waste product, by combining two solids, including a water-reactive metal chloride from which HCl is released without forming an aqueous HCl phase.

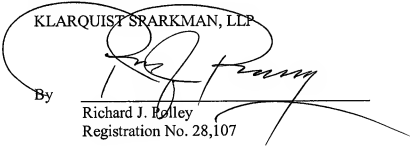
The claims should be allowed.

Respectfully submitted,

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